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R & D STATUS REPORT

DARPA ORDER NO.: 7589   PROGRAM CODE NO.: AA 9700400.1304

CONTRACTOR: Environmental Research Institute of Michigan

EFFECTIVE DATE OF CONTRACT: 01 OCT 1990

EXPIRATION DATE OF CONTRACT: 30 SEPT 1991

PRINCIPAL INVESTIGATOR: Fred J. Tanis
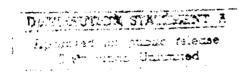
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SHORT TITLE OF WORK: ARCTIC OPTICAL

REPORTING PERIOD: 01/JUL/91 - 30/SEP/91

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DESCRIPTION OF PROGRESS:

Program Task I: Assemble Existing Data

Study Region: 60N-90N Latitude; 50W-40E Longitude

Item 1: Assemble oceanographic data. An extensive Norwegian database has been assembled for the Barents Sea and other portions of the study region. Hydrographic data have been assembled into a database with approximately 100,000 station sets covering the entire study region and the time period from as early as 1910 through 1980 with 4,000 stations collected from 1980-1987. Long term annual mean temperature and salinity data received have been processes for 33 ocean layers from surface to 5500m depth. Monthly means are also being compiled for the mixed layer. Results are being re-sampled to a 25km polar stereographic grid. Additional datasets are being sought. Long term mean and seasonal datasets have been acquired from NODC. The long term near surface K490 diffuse attenuation value has been derived from CZCS data using the Gordon (et. al. 1983) algorithm which was adjusted to fit local high latitude in situ measurements made from multiple cruises(PROMARE, CEAREX, and LYNCH). Optical transmission properties for deep ocean layers are also being derived from these in situ measurements combined with the hydrographic data.

Item 2: Assemble snow/ice data. The RAND snow model has been combined with snow depth measurements made in the study region during several experiments (MIZEX, CEAREX, etc.) to formulate a blended model which reflects the RAND climatological estimates in the high Arctic and the measurement data at lower latitudes and along the MIZ. These latter data include results from 286 ice cores. A blended model for sea ice thickness has been derived from ice cores data combined with that derived as unclassified ice thickness maps from submarined sonar data. SSMR data have now been acquired for the period 1978 through 1986.

Item 3: Assemble cloud data. The ISCCP (International Satellite Cloud Climatology Project) C1 and C2 data retrieval and resampling algorithms have been completed. Three years of C1/C2 data have been received for the study region (1984, 1985, and 1986). The 1984 data set has been resampled for 25 cloud parameters on a 25km grid spacing. Working on an approach to derive optical thickness estimates in the visible region using SSM/I passive microwave data and cloud parameters as identified with infrared channels in the ISCCP data set.

Study Task II: Model Development.

Items 6, 7 and 8: <u>Develop a regional multilayered descriptive model.</u> The regional cloud/ice/ocean regional descriptive model is nearing completion. Work on an interface between the environmental descriptive model and a system performance model has been initiated. This approach will allow random sampling of environmental parameters from ice, snow, and cloud distribution function derived from the assembled data sets. Water seasonal optical components are based upon mean water types. These include Atlantic water, Norwegian Coastal water, Atlantic intermediate water, Arctic surface water, and Polar water. Environmental data inputs include solar and lunar irradiances along user specified ship tracks.

<u>CHANGE IN KEY PERSONNEL:</u> None

<u>SUMMARY OF SUBSTANTIVE INFORMATION DERIVED FROM SPECIAL EVENTS:</u>

A visit was made to the NOSC, San Diego, California on August 18. The purpose of this trip was to begin initial performance calculations using the climatological database.

<u>PROBLEMS ENCOUNTERED AND/OR ANTICIPATED:</u> None.

<u>ACTION REQUIRED BY THE GOVERNMENT:</u> None.
<u>FISCAL STATUS:</u>
        (1) $348,196
           (2) $286,290

Fred J. Tanis
Program Manager